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THE IRISH POTATO.

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THE IRISH POTATO.

BY R. H. PRICE, B. S.

In 1895, soon after the completion of our experiments on the sweet potato, the irish potato was taken up as one line of experimental work. The work on this line was temporarily delayed on account of lack of funds to carry it on, and also to publish the results of our experiments. The facts, however, herein recorded, while losing some in freshness, have not lost any in importance.

As an article of human food, the irish potato is used almost as extensively as indian corn. It adapts itself to wide variations in soil and climate. Like the sweet potato, it is attracting attention as food for stock. In this State, it ranks second to the sweet potato in number of acres cultivated and value of crop grown. The main reasons why it has not been grown to a larger extent in this State may be stated to be the difficulty in keeping the tubers in storage, the injury done by insects and fungus diseases, and the costliness of seed to plant in the spring. It is a well known fact that a large per cent. of the crop grown in the State is lost by decay soon after it is matured. In the year 1895, the value of the crop per bushel dropped to thirty cents in July and reached fifty cents in September. This fact indicated the crowded condition of the market in July. From October on until the next crop matures the following year the money is sent out of the State for irish potatoes. The amount of irish potatoes shipped into the State for seed in the Spring is enormous. At the 15th of February, 1895, one grower from Massachusetts advertised he had already shipped into the State twenty carloads of the Triumph variety for seed the following spring, and these twenty carloads were valued at $7700. I have learned that orders for several carloads of Northern seed potatoes were made as early as September in 1897. In this Bulletin will be found some results so far obtained in testing over fifty varieties, many of which are new, in keeping them, in preventing injury done by some diseases, and in testing the effects of different fertilizers upon the yield.

TEST OF VARIETIES.

The soil upon which the test of varieties was made has the same characteristics as that described in Bulletin No. 36 for sweet potatoes. It is a rather dark, heavy, sandy clay, with an almost impervious, grayish subsoil. The soil is only moderately fertile. Upon it a peach orchard had grown for sixteen years. The ground was plowed in the fall and in February, just before planting time. After harrowing it thoroughly it was in excellent condition. Rows were made across the experimental

plot fifty feet long and about four inches deep and three and a half feet apart. The tubers were cut to two eyes and the pieces were dropped in the rows fourteen inches apart. "Seed ends" were rejected. They were planted March 5th to 11th. Dirt was thrown on the pieces by a broad sweep run once between the rows, to cover them. This operation left a ridge above each row of potatoes. These ridges were left until the potatoes began to come through, when a light harrow was run over the ground to drag the ridges down somewhat and to kill young weeds which had come up. Shallow cultivation was given after each rain, and the ground was kept in excellent condition. No cultivation was given after the potatoes began to bloom.

The season was rather wet and a few tubers rotted before they could be harvested, but it is believed that the loss from this source would affect the yields given in the following table not very materially.

The yield for each variety for first crop is calculated in bushels per acre, while the yield of each variety for second crop is given in pounds and ounces for a f"ty-foot row planted. This indicates, perhaps, most correctly the adaptability of each variety for growing a second crop. A large per cent. of many varieties failed to come up when planted for this second crop. The tubers for this second planting were also cut to two eyes. This subject will be discussed more fully under another heading further on. For the keeping test, the results of which are given in the table, the tubers of each variety were spread out under partial shade and covered about three inches thick with hay. The ground was kept moist by sprinkling water over it at intervals as needed. A large per cent. of some varieties sprouted soon, and quite a large per cent. of a number of other varieties remained solid and firm until October. Each variety, however, finally produced some second crop potatoes under these circumstances. The note on keeping quality in the table was taken on each variety as it appeared the 1st of October, and it will be seen that this quality is, in almost every instance, inversely proportional to the adaptability for growing a second crop; that is to say, a variety which sprouts early and does not keep well is very apt to be good to grow a second crop, and those which keep well are not the best for second crop growing.

The notes in regard to season were taken when the tops were nearly dead and the crop was about ready to be dug. Some varieties had large tubers on before the vines began to die, and, if dug then, would have made a large yield, but as the skin slips off easily when the tubers are dug in such immature state and thus prevents them from being shipped and stored to best advantage, it was thought best not to make the note on season based upon the development of the tubers. At the same time, it is admitted that the foliage is often killed by blight and causes the crop to ripen prematurely. Care must be taken to distinguish the difference between blight and ripening. The growers' usual test for maturity and fitness to be dug is when the skin on the tubers will not slip when rubbed with the hand. Owing to the wet, and, consequently, somewhat abnormal season, the note on season of ripening might be slightly different if taken during a more normal season. For instance, the Early Rose is listed in the table as a medium early variety, which characteristic it showed in our test last year, while it is almost universally admitted to be an early variety.

TABLE I. VARIETIES OF IRISH POTATOES.

Name of Variety.	Seedsman.*	Season.	Keeping quality.	Calculated bushels per acre.			Yield of 2d. crop from 50 ft. row.—lbs.& ozs.
				Large.	Small.	Total.	
Beauty of Hebron	Thor.	Early ..	Fair	166.09	.....	166.09	10.5
Bill Nye	Hen..	Late...	Fair	196.02	1.99	198.01	5.0
Bliss' Triumph (1st crop seed)	Dib ..	Early ..	Good	114.34	.....	114.34	4.5
Bliss' Triumph (2nd crop seed)	Sta...	Early ..	Very good	270.50	0.50	271.00	(†)
Carman No. 1	Thor.	Late ...	Good	168.79	.....	168.79	8.5
Carman No. 3	Thor.	Late ...	Good	108.90	0 59	109.49	5.2
Chas. Downing	Hen..	Medium	Good	155.29	1.03	156.31	4.0
Clarke's	Hen..	Late ...	Fair	192.39	1.19	193.58	5.0
Delaware	Thor.	Late ...	Good	108.60	.....	108.60	5.7
Early Essex	Dib ..	Early ..	Good	204.09	0.94	205.03	13.5
Early Harvest	Dib ..	Early ..	Good	171.95	0.90	172.85	12.5
Early Hebron	Dib ..	Early ..	Poor	171.62	0.91	172.52	14.3
Early Norther	Hen..	Late ...	Fair	237.76	1.99	239.75	5.2
Early Ohio	Hen..	Early ..	Good	277.69	0.54	278.23	5.0
Early Puritan	Hen..	Medium	Fair	295.54	11.90	307.44	5.1
Early Rose	Thor.	Medium	Poor	217.80	1.03	218.83	6.0
Early Sunrise	Dib ..	Early ..	Fair	152.46	0.92	153.38	10.5
Empire State	Thor.	Late ...	Fair	199.65	1.19	200.83	15.0
Everett's Heavy Weight	Dib ..	Late ...	Fair	165.16	1.58	166.74	10.7
Great Divide	Dib ..	Late ...	Fair	112.90	0.44	113.34	10.5
Ideal	Hen..	Late ...	Good	199.65	1.19	200.84	3.8
Irish Daisy	Thor.	Late ...	Poor	161.53	2.96	164.49	14.5
Late Beauty of Hebron	Dib ..	Medium	Fair	161.53	.....	161.53	10.0
Late Puritan	Dib ..	Medium	Good	161.53	...	161.53	10.0
Lightning Express	Dib ..	Medium	Fair	246.84	18.10	264.94	4.0
Maggie Murphy	Dib ..	Medium	Good	181.50	0.52	182.02	16.5
Money Maker	Dib ..	Late ...	Good	148.83	1.00	149.83	24.7
Monroe Seedling	Hen..	Late ...	Fair	156.09	1.19	157.28	5.2
New Queen	Thor.	Early ..	Fair	216.90	0.90	217.80	8.0
Orphan	Dib ..	Late ..	Poor	72.40	1.81	74.21	32.0
Pearl of Savoy	Hen..	Late ...	Fair	128.03	.. ..	128.03	5.2
Pride of the West	Hen..	Late ...	Poor	36.30	1.81	38.11	3.0
Peerless Jr.	Dib ..	Late ...	Poor	108.96	0.73	109.63	4.0
Queen	Hen..	Late ...	Good	235.95	.....	235.95	7.5
Restaurant	Hen..	Late ...	Fair	226.67	2.10	228.77	10.1
Rural New Yorker	Dib ..	Late ...	Fair	130.68	0.72	131.40	7.0
Rochester Rose	Hen..	Late ...	Fair	236.95	0.10	237.05	4.0
Saint Patrick	Hen..	Late ...	Good	108.90	1.19	110.09	6.5
Snow Drop	Hen..	Late ...	Fair	235.95	1.19	237.14	3.0
State of Maine	Thor.	Late ...	Good	156.09	....	156.09	8.0
Summit	Dib ..	Medium	Good	235.95	1.19	237.14	16.5
Sunlit Star	Thor.	Early ..	Fair	138.04	1.19	139.23	7.0
Superior	Hen..	Late ...	Fair	145.20	1.19	149.39	8.0
The Thorburn	Thor.	Medium	Fair	179.68	.....	179.60	7.0
Vanguard	Hen..	Late ...	Fair	204.09	2.36	206.40	2.8
Ward's Early	Dib ..	Early ..	Fair	223.24	0.90	224.14	6.0
White Elephant	Hen..	Late ...	Fair	132.49	1.55	134.04	2.8
White Prize	Dib ..	Medium	Fair	171.95	0.47	172.42	18.0
White Star	Hen..	Late ..	Fair	98.01	1.03	99.04	4.0
Wonderful Clay Rose	Dib ..	Late ...	Fair	98.01	0.90	98.91	5.7
World's Fair	Dib ..	Medium	Fair	121.60	1.00	122.60	2.0

*"Dib." stands for Edward F. Dibble Seed Co., Honeoye Falls, N. Y.; "Hen.," Peter Henderson & Co., New York City, N.Y.; "Sta.," Texas Experiment Station; "Thor.," J. M. Thorburn, New York City, N. Y. †Not tested.

EARLY VARIETIES.

The following brief notes on the varieties may be of value:

Beauty of Hebron.—Oblong, smooth; color dull white; vine grew three feet high, affected some by blight; a good variety.

Bliss' Triumph.—Large, round, smooth; eyes somewhat sunken; color light red; vine grew three feet high, grown from both spring and fall crop seed; was affected some by blight, but the crop from "Northern" seed was affected much more, and no doubt lowered the yield considerably. This is a very popular variety in some of the Southern States, and on this account has been sold in the State under several different names, such as "Tennessee Triumph," "Baker's Triumph," "Red Bliss," and "Jeff Wellborn Triumph." This valuable variety is said to have been "grown from a seed ball of the well known Peerless, crossed with a seedling of the Early Rose in Connecticut, and introduced in 1878 by B. K. Bliss & Sons, then of New York City." Keeps well. Grows good second crop if the tubers be well prepared by exposure to sunlight. In order to prevent confusion, the word "Triumph" only should be used, and after it, "first" or "second crop," as the case may be. This variety is, perhaps, the most popular one in the State to-day.

Early Essex.—Round to oblong, smooth, eyes a little sunken; color white; vine grew three feet high; a valuable variety.

Early Harvest. — Large, round and somewhat flattened, rather uneven; vine grew three feet high; hardly desirable.

Early Hebron.—Good size, round to oblong, smooth; color dull white; vine grew three feet high; a good variety.

Early Ohio.—Large, round to oblong; color dull white; vines grew three feet high; an excellent variety for spring crop, but has done very poorly for fall crop; keeps well.

Early Sunrise. — Medium size, long, smooth; color light red; vines grew three feet high.

Queen (*New Queen*).—Round to oblong, slightly flattened, smooth; eyes a little sunken; color dull white; vines grew three feet high; affected some by blight; a valuable new variety. Introduced by W. P. Jerrard, Caribou, Me.

Sunlit Star.—Oblong, smooth; color light red; vines grew three and a half feet high; affected some by blight.

Ward's Early.—Small, round, smooth; color white; vines grew three and a half feet high; forms tubers early.

MEDIUM EARLY VARIETIES.

Chas. Downing.—Oblong, smooth, inclined to grow small; color white; vines grew three feet high; yielded a small crop.

Early Puritan. — Oblong, smooth; color white; vine grew four feet high; largest yielding variety tested. Introduced by Peter Henderson & Sons, N. Y.

Early Rose.—Oblong, a little uneven; made a heavy yield; this well known old variety is usually classed among the earliest, but it was not so in our test last year. We have tested it at other places in former years, and it was quite early.

Late Beauty of Hebron.—Large, oblong, smooth; color dull white; vine grew three feet high.

Late Puritan.—Oblong, smooth, color white; vine grew four feet high; not desirable. Introduced by Peter Henderson & Co.

Lightning Express. — Large, oblong, smooth; color light red; vines grew four feet high; very vigorous and healthy; a promising new variety.

Maggie Murphy.—Good size, round to oblong, smooth; color light red; vines grew four feet high; a desirable variety.

Summit.—Oblong, smooth; color white; vines grew four feet high; a large yielder.

The Thorburn.—Oblong, smooth; color dull white; resembles Queen; vines grew three and a half feet high.

White Prize.—Good size, round to oblong, smooth; color dull white; vines grew three feet high; grows good second crop.

World's Fair. — Small, round to oblong, smooth; color white; vines grew three and a half feet high.

LATE VARIETIES.

Bill Nye.—Oblong, smooth; color white; vines grew four feet high; not a promising variety.

Carmon No. 1.—Oblong, smooth; color white; beautiful; vines grew four feet high; keeps well. Much better than the following one, originated by E. S. Carmon, editor Rural New Yorker.

Carmon No. 3.—Oval, somewhat flattened, medium size, smooth; color white; vines grew three and a half feet high. An even, smooth potato, but it did not yield heavily last year. Originated by E. S. Carmon, editor Rural New Yorker.

Clark's.—Round to oblong, smooth; color light red; vines grew four feet high.

Delaware.—Round, very smooth; color white; vines grew four feet high; keeps well; made low yield for second crop.

Early Norther.—Round to oblong, smooth; color dull white; vines grew four feet high. Originated by W. P. Jerrard, Maine, 1887. Heavy yielder.

Empire State.—Oblong, smooth; inclined to grow uneven and small; color white; vines grew four feet high.

Everett's Heavy Weight. — Round, small, smooth; color white; vines grew three and one-half feet high; too small to be desirable.

Great Divide.—Oblong, oval; color white; vines grew four feet high. A beautlful potato, but it has not made a large yield. Originated by F. B. Van Orman, Iowa.

Ideal.—Oblong, a little rough; color light red; vines grew four feet high; keeps well, but it is not promising for a second crop.

Irish Daisy.—Round, small, smooth; color white; vines grew three and one-half feet high. Has no great promise.

Money Maker.—Oblong, rather small, smooth; color white; vines grew four feet high. Very promising for second crop. Introduced by Edward F. Dibble Seed Co., Honeoye Falls, N. Y.

Monroe Seedling.—Oblong, small, smooth; color white; vines grew four feet high.

Orphan.—Round to oblong, small and smooth; color white; vines grew

three and one-half feet high. Does not keep well. The most promising variety in the test for second crop.

Pearl of Savoy. — Round to oblong, smooth; color light red; vines grew four feet high.

Pride of the West. — Round, smooth; color dull white; vines grew three feet high. One of the poorest varieties in the test.

Peerless, Jr.—Round, somewhat flattened, smooth; color white and beautiful; vines grew three feet high and very erect. Has peculiar narrow foliage, resembling that of Rural New Yorker No. 2. This new variety was not promising in our test.

Restaurant.—Oblong, inclined to grow small; color white; vines grew four feet high. Made a large yield.

Rural New Yorker No. 2.—Round, somewhat flattened; color white; vines grew three and one-half feet high. A large variety, but the yield was not great.

Rochester Rose.—Oblong, slightly flattened; color light red; vines grew three and one-half feet high. Made large yield. Seedling of Early Rose.

Saint Patrick.—Oblong, inclined to grow small; color white; vines grew four feet high.

Snow Drop.—Round to oblong, slightly flattened; color white; vines grew three and one-half feet high. Made a large yield.

State of Maine. — Round, somewhat flattened, smooth; color white; vines grew three and one-half feet high. Keeps well and is a promising variety.

Superior.—Oblong, rather small, smooth; color white; vines grew four feet high.

Vanguard.—Oblong, inclined to grow small, smooth; color light red; vines grew four feet high. Made a good yield.

White Elephant.—Oblong, smooth, inclined to grow small; color white; vines grew four feet high. This well known old variety did not make a heavy yield.

White Star.—Oblong, smooth, inclined to grow small; color white; vines grew three feet high.

Wonderful Clay Rose. — Oblong to round, smooth; color light red; vines grew three and one-half feet high. Not a desirable variety. Introduced by Edward F. Dibble Seed Co., N. Y.

APPLICATION OF FERTILIZERS.

What kind of fertilizers to use and how much to apply to an acre of Irish potatoes are questions frequently asked of the writer. To answer these questions properly something must be known of the conditions confronting the grower, such as soil and costliness of materials. Some soils may be deficient in one thing and some others deficient in another. As a general rule, it may be stated that sandy loam soils are deficient in potash and heavy clay soils are deficient in phosphoric acid. If the grower has plenty of wood ashes, cotton seed hull ashes, or barnyard manure, it will not pay to invest largely in commercial fertilizers at the present costly rates in this State. However, it is advisable for the grower to experiment for himself by using different fertilizers in different quantities. The plan and results of our own fertilizer work along this line may help the grower in this work.

The soil upon which our fertilizer test was made has the same characteristics as that described for the varietal test. The same fertilizers were applied in the same quantities upon sweet potatoes during 1894.

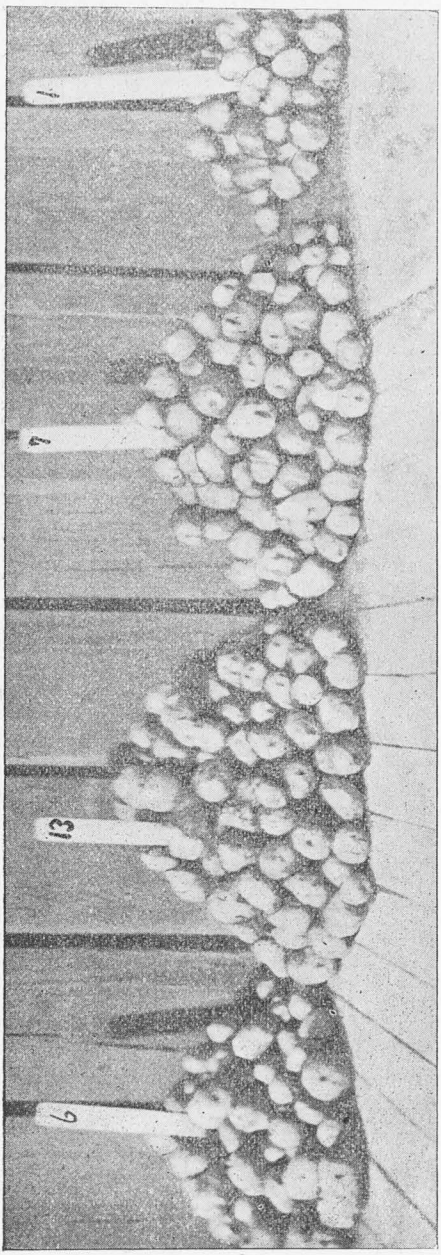

Fig. 1.

Yields from 50-foot rows, showing effect of fertilizers: No. 1—Nitrate of soda, applied at the rate of 450 pounds per acre. No. 6—Cotton seed meal, applied at the rate of 500 pounds per acre. No. 7—Composted barnyard manure and wood ashes, applied at the rate of 20,000 pounds per acre. No. 13—Mixture of bone-black, 300 lbs., and potassium sulphate, 200 lbs., applied at the rate of 500 pounds per acre.

It is interesting to note that the fertilizer that made the largest yield of sweet potatoes has also made the largest yield of irish potatoes, viz., 300 pounds of bone-black mixed with 200 pounds potassium sulphate for one acre. The very costly fertilizer, nitrate of soda, which lowered the yield of sweet potatoes, has in every instance lowered the yield of irish potatoes below the general average of the three check plots. This result was plainly foreshadowed through the season of growth by the much weaker growth of vines on the plots which contained nitrate of soda. The fertilizers could not have injured the seed, because they were not put on until the seed was covered with soil about two inches. The fertilizers were then broadcasted over the row, and more soil was thrown on by a broad sweep. The attention of the Station Chemist was called to this effect of nitrate of soda upon the growth, and some of it was taken into the station laboratory and tested for acid, but none was found. It was bought of a very reliable firm, and guaranteed to be first-class. So far as our results go, it seems plain that a fertilizer that is best for sweet potatoes is also best for irish potatoes. It will be seen from the table that cotton seed meal was applied at a loss. The value of cotton seed meal can not be so easily judged in one year, because the fertilizing ingredients are not so readily available to the plant in this organic form as they are in the mineral form.

Potash, either in the form of muriate or sulphate, produced a paying crop.

Bone-black was the best one-sided fertilizer. This fact indicates the general lack of this soil for phosphoric acid.

The Triumph variety from our own second crop seed was used in the fertilizer test, and was carefully cut to two eyes, the "seed end" being rejected.

TABLE II. FERTILIZER TESTS.

No. of Exp'mt.	Rate of fertilizer used per acre.	Calculated bushels per acre.			Gain or loss per acre.
		Large.	Small.	Total.	
1	460 lbs. sodium nitrate	217.80	1.27	219.07	$41.37 loss.
2	150 lbs. potassium muriate	351.14	1.62	352.76	33.05 gain.
3	300 lbs. bone-black	353.92	0.94	354.86	35.01 gain.
4	200 lbs. potassium sulphate	319.44	0.96	320.40	16.28 gain.
5	Nothing	308.55	0.91	309.46	
6	500 lbs. cotton seed meal	284.95	1.17	286.12	1.36 loss.
7	20 tons barnyard manure, composted with wood ashes	333.04	0.94	333.98	7.57 gain.
8	600 lbs. special sweet potato fertilizer, prepared by Powell Chemical Co	326.70	0.90	327.60	14.76 gain.
9	Nothing	254.10	0.47	254.57	
10	460 lbs. sodium nitrate, 200 lbs. potassium sulphate	225.06	0.44	225.50	41.17 loss.
11	460 lbs. sodium nitrate, 150 lbs. potassium muriate	199.65	0.30	199.95	53.94 loss.
12	460 lbs. sodium nitrate, 300 lbs. bone-black	234.10	0.68	234.78	36.45 loss.
13	300 lbs. bone-black, 200 lbs. potassium sulphate	363.00	0.94	363.94	35.05 gain.
14	460 lbs. sodium nitrate, 300 lbs. bone-black, 200 lbs. potassium sulphate	235.95	0.54	236.49	39.17 loss.
15	Nothing	271.50	1.00	272.50	
16	4360 lbs. slaked lime	272.25	0.41	272.66	24.42 loss.

The average of the three check plots is 278.84 bushels.

The potatoes were valued at 50 cents per bushel.

The following rates per ton give the cost of the fertilizers laid down here in small quantities: Sodium nitrate, $50; bone-black, $20; cotton seed meal, $20; muriate, $40; sulphate, $45; lime, $10; barnyard manure, $1.

EXPERIMENTS IN STORING THE TUBERS.

Keeping irish potatoes is the most important part of the work we have undertaken on this vegetable, in my opinion. If some cheap and easy method of keeping were known, the cost of seed to plant would at once become less and importations would soon greatly decrease, since large crops can be grown in the State.

There are several things to contend with in keeping Irish potatoes over summer in this warm and dry Southern climate. The crop matures in early summer, and in this respect differs from the sweet potato, which matures in the fall, and, therefore, is not difficult to keep over summer. Two months of dry, hot weather usually follow after the crop matures. If, in the meantime, rain falls, the conditions for decay are made better.

Blight frequently kills the vines and causes the crop to ripen pre-

maturely. Several species of fungi and bacteria take advantage of the favorable conditions of temperature and moisture when the tubers are put in piles in summer, and soon produce one soft putrid mass of the whole. We have been experimenting along this line for two years, and while we can not at this time offer a safe and sure plan for keeping the tubers, still, we can offer one which has value. Many may be interested in some tests which have failed to give satisfactory results.

The French are reported to have a method of dipping the tubers in a solution of sulphuric acid to kill the eyes and prevent them from growing. We have tested this method along with others. On July 10th, 1894, when a small crop was harvested, one-half bushel of the Triumph variety was placed in each of seven trays for treatment. The first lot was not treated with anything. The second was treated with Bordeaux mixture; third, slacked lime; fourth, immersed in sulphuric acid of 2 per cent solution for fifteen minutes; sixth, immersed in sulphuric acid of 2 per cent solution for one hour; seventh, lime and sulphur spread over the tubers. The trays were then placed in partial darkness and covered. In six weeks many of the tubers of each lot had decayed and others were sprouting. It was plain that the sulphuric acid solution was not strong enough to kill the eyes. There were more sound tubers in the seventh lot, which had been well sprinkled with lime and sulphur. While these materials gave partially good results, they were rated failures under the conditions mentioned.

Large quantities were placed in barrels containing dry sand. This method proved a failure, as the tubers soon rotted. Tubers were placed two feet under ground and covered one foot deep with soil. Tiling was run through the center to give ventilation. The tubers all rotted under these conditions in six weeks. Tubers were spread out on the ground under partial shade and covered with hay about two inches deep, where they were kept moist by being sprinkled with water from a hose. All the varieties mentioned in this Bulletin were treated in this manner, and 50 per cent of some kept well until the first of October. Enough sound tubers of each variety were obtained to be sent to the State Fair held on the 19th of October, 1895. This method would probably be satisfactory if the temperature could be lowered to 40 or 50 degrees, as I have kept them in this way in a State further north than Texas.

Several rows of the Triumph variety were left in the experimental plots as they grew and not dug. A turning plow was used to throw dirt upon each row, and in that condition left until the 15th of the following February. These tubers were examined on the 15th of August, and about 75 per cent had kept well, 50 per cent had decayed by the 1st of September. Some sound potatoes were dug on the 15th of February. Many of the tubers threw up vines after the fall rains came, and produced some small second crop potatoes.

All things considered, this was the best method of keeping so far tested in these experiments, but it is not satisfactory. By it the crop can frequently be held four weeks without serious loss, reasoning from this one experiment.

SECOND CROP.

By second crop is meant potatoes which are grown late in summer and fall from the potatoes which are dug early in the summer and planted any time from last of July to last of August.

The great value of this crop lies in the fact that it is easy to keep over winter in Southern climates and, consequently, is in excellent condition for planting in the spring. We have grown second crop potatoes for four years and used them for planting. So far as our experience goes, it seems safe to conclude that second crop potatoes are as good, if not better, for planting than Northern grown seed. This fact will save the importation of large quantities of Northern grown seed every year for spring planting. Growing second crop needs to be greatly encouraged in the State. In some Southern States second crop potatoes have been grown for twenty years. One grower writes that he has grown it in Texas for fifteen years. At present, however, the grower who uses this second crop for seed is the exception.

HOW TO GROW SECOND CROP.

The Soil.—The best soil is, perhaps, a rich sandy loam kept in fine tilth. The same soil upon which the spring crop grew can be used. If this soil be not rich it would be better to use soil upon which no crop grew and was ploughed two or three times during spring and summer, so as to bring it into fine tilth by plowing and harrowing. Rows should be made across it about three feet apart and four to six inches deep just before it is ready for planting. As a general rule, the best time to plant in this latitude is about the 15th of August. It is best to plant after a rain when the ground comes into proper condition. We have grown a good crop when planted on the 20th of July, after rain had moistened the soil.

MANAGING TUBERS TO GROW SECOND CROP FROM.

The tubers that are to be used for a second crop seed should ripen thoroughly before they are dug. If they be dug before maturity they will not sprout so rapidly. After the tubers are dug they should be spread out in the sunlight for a day or two so that they will assume a slightly green color. After this it is better to spread the tubers out on the ground, in shade, and cover two or three inches with straw, hay, or pine needles, and keep damp. Eyes of the early varieties will begin to show signs of growth in about two weeks, when they are ready to be planted.

There is a difference of opinion as to the best size of tubers to be planted. Growers frequently use the small ones for this crop. Our best results have been obtained by using large tubers and cutting them to two eye-pieces and planting them immediately after being cut. Small potatoes have been harder to sprout. The pieces were dropped in the rows previously mentioned and covered about three inches deep with a plow. After growth took place more dirt was thrown on them. Level culture was followed. During 1895, when the ground became very dry in September, it was irrigated. If irrigation be used there is no reason why one should fail to grow a second crop. However, if the tubers be planted in the trenches mentioned, a fair crop can be grown during most any season.

There are a few biting insects which are apt to injure the second crop. These can be easily killed by using some form of the arsenical compounds for spraying mentioned in our Bulletin No. 36.

This far South, we have let the second crop stay in the ground where it grew till wanted for planting in the spring, and it kept nicely. We have also dug a part of the crop and stored it away in sand kept in the potato house described in Bulletin No. 36, where it kept practically without loss.

DISEASES OF THE IRISH POTATO.

Both the vines and the tubers are subject to disease. Frequently fungus diseases attack the vines and cause premature ripening, thereby lowering the yield and diminishing the keeping quality. A few of the diseases we have had to fight against will be mentioned here.

Fig. 2.—Early Leaf Blight.

EARLY BLIGHT (*Macrosporium solani*).—This fungus disease confines its attacks to the leaves and stems. The following description of the appearance of the disease is here given as made by Prof. B. T. Galloway: "At first the older leaves show greenish-brown spots, the affected parts becoming hard and brittle. The disease progresses rather slowly, the spots gradually becoming larger, especially along the edges of the leaflets. At the end of ten days or two weeks half of the leaf surface may be brown, withered and brittle, while the rest is a pale yellow color.

Three weeks or a month may elapse before all the leaves succumb, the stems in the meantime remaining green, until they finally perish through lack of nourishment. The tubers stop growing almost as soon as the leaves are attacked, and as a result the crop is practically worthless." This is the most serious disease we have had here. Some varieties are attacked much more severely than others. The disease has spread here much more rapidly during dry weather than during wet weather.

Experiments were undertaken last year in trying to prevent this disease with Bordeaux mixture, but this powerful fungicide had no effect upon the disease. Unsprayed rows by the side of the sprayed ones were just as healthy. Spraying was commenced when the vines were about six inches high, just before the disease appeared, and repeated every ten days or two weeks afterwards. Spraying followed every rain. Our common formula was used, which has given marked results in preventing injury done by fungus diseases to the grape, the blackberry and other fruits. A part of the same mixtures were used in 1894 on blackberry foliage, and the results were highly beneficial. Where the foliage of the blackberries was not sprayed with it the brown spot fungus soon spread over the entire leaves and defoliated the canes early in the season. The formula used was 2 pounds copper sulphate, 2½ pounds unslacked lime, and 25 gallons of water. Perhaps this mixture was not strong enough for this fungus, as beneficial results have been reported from the use of bordeaux as well as negative results from some other places. This work will be enlarged the present season.

Fig. 3.—Late Blight.

LATE BLIGHT (*Phytopthora infestans*).—This fungus disease, which has done much injury to the vines in the Northern and Eastern States, has not been observed here. Since it occurs late in the season and at a daily mean temperature of 72 to 74 degrees Fahrenheit for a considerable time followed by moist weather, it may never do much damage in this State, since the climatic conditions are different. Bordeaux mixture is said to give good results when used for this disease.

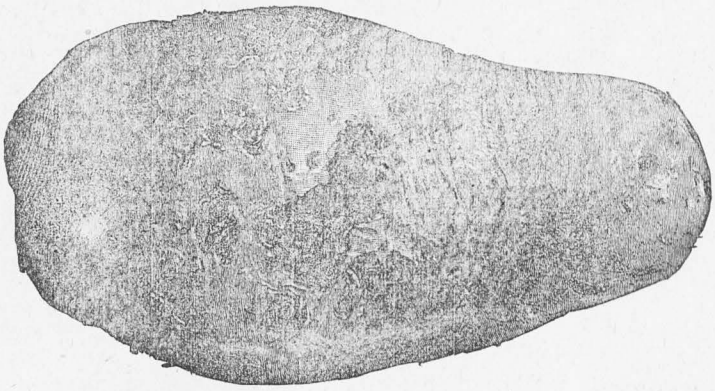

Fig. 4.—Potato Scab.

POTATO SCAB (*Oospora scobies*, Thax.).—It is not our object to enter into a discussion of the cause of scab, as exhaustive studies have been made of it by three Experiment Stations. There seem to be three causes of scab, a fungus, a bacterium and an insect. Fortunately, however, the same treatment seems to be equally effective for all. The corrosive sublimate treatment has been used here successfully.

This treatment consists in dissolving 1 ounce of corrosive sublimate (mercuric bichloride) in 7½ gallons of water, and immersing the uncut tubers therein for one and a half hours. To make it, dissolve 1 ounce of the poison in two gallons of hot water placed in a bucket, then pour it into a barrel and put in 5½ gallons more water. The potatoes may be suspended in a coarse sack hung in the barrel. Corrosive sublimate is a deadly poison and should be handled with great care. This treatment sometimes kills the eyes and lowers the stand.

Recently Professor Byron D. Halsted has proven that sulphur is a better preventive of scab than corrosive sublimate when used at the rate of 300 pounds per acre. Freshly cut tubers were rolled in the sulphur and some was also sprinkled along in the rows.

There are two precautions which should be observed in reference to scabby potatoes: first, no scabby ones should be used for planting; second, ground which grew scabby potatoes should not be planted again for sometime.

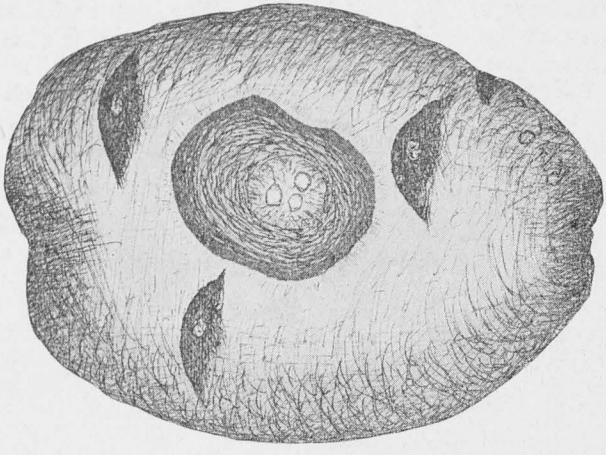

Fig. 5.—Dry Rot.

Dry Rot (*Fusarium solani*).—This disease appears on the tubers in the form of a dark brown spot which is sunken beneath the surface of the potato. It is nearly circular, and gradually spreads over the entire surface. The disease spreads more rapidly if the tubers be kept moist. We have found no remedy for this disease. There are a number of diseases which cause decay of tubers that we have at present no remedy for. If the tubers be well matured and be kept in a moderately moist atmosphere with low temperature the loss from them will be greatly obviated.